FIG. 1A

PRIOR ART

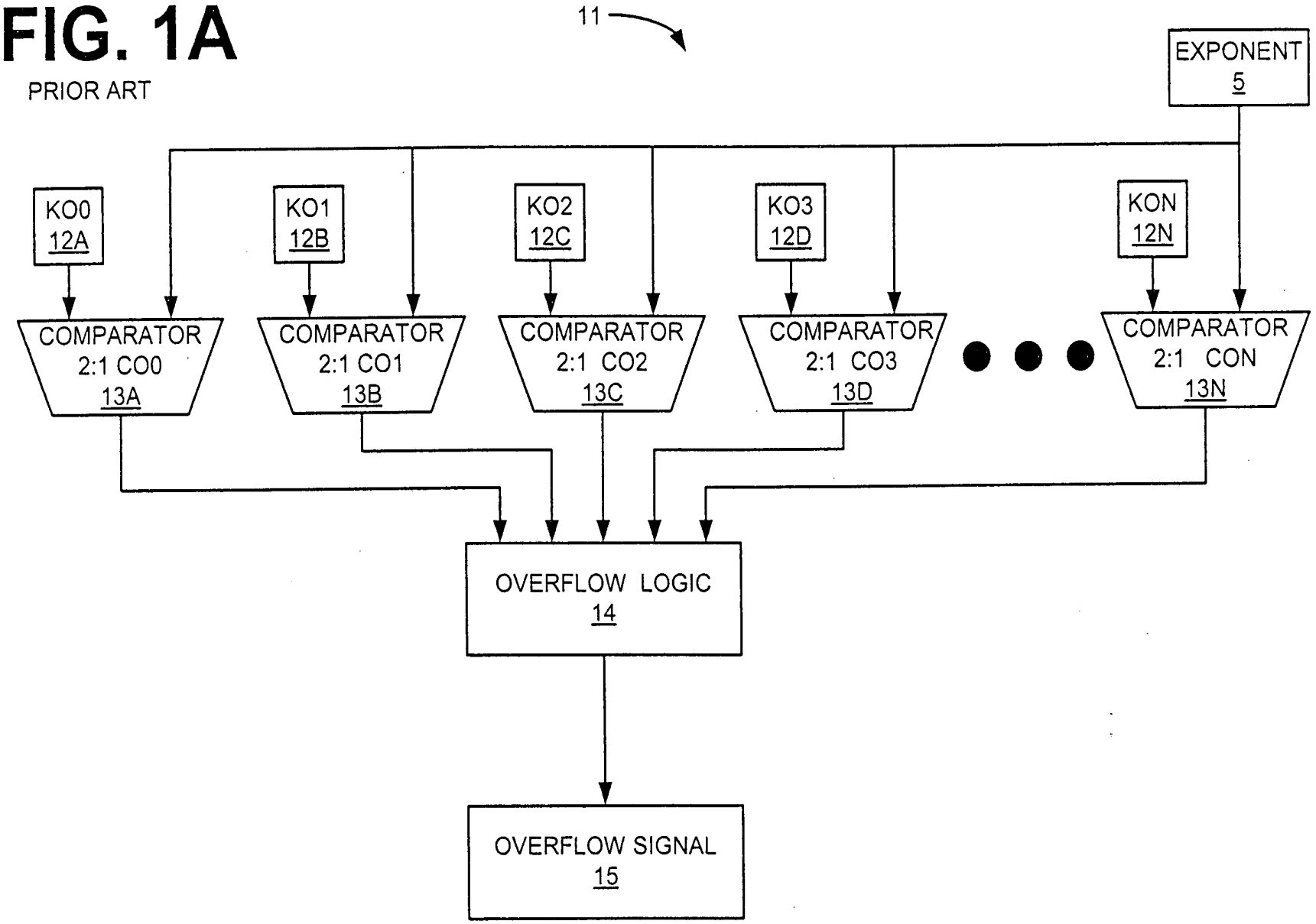


FIG. 1B

PRIOR ART

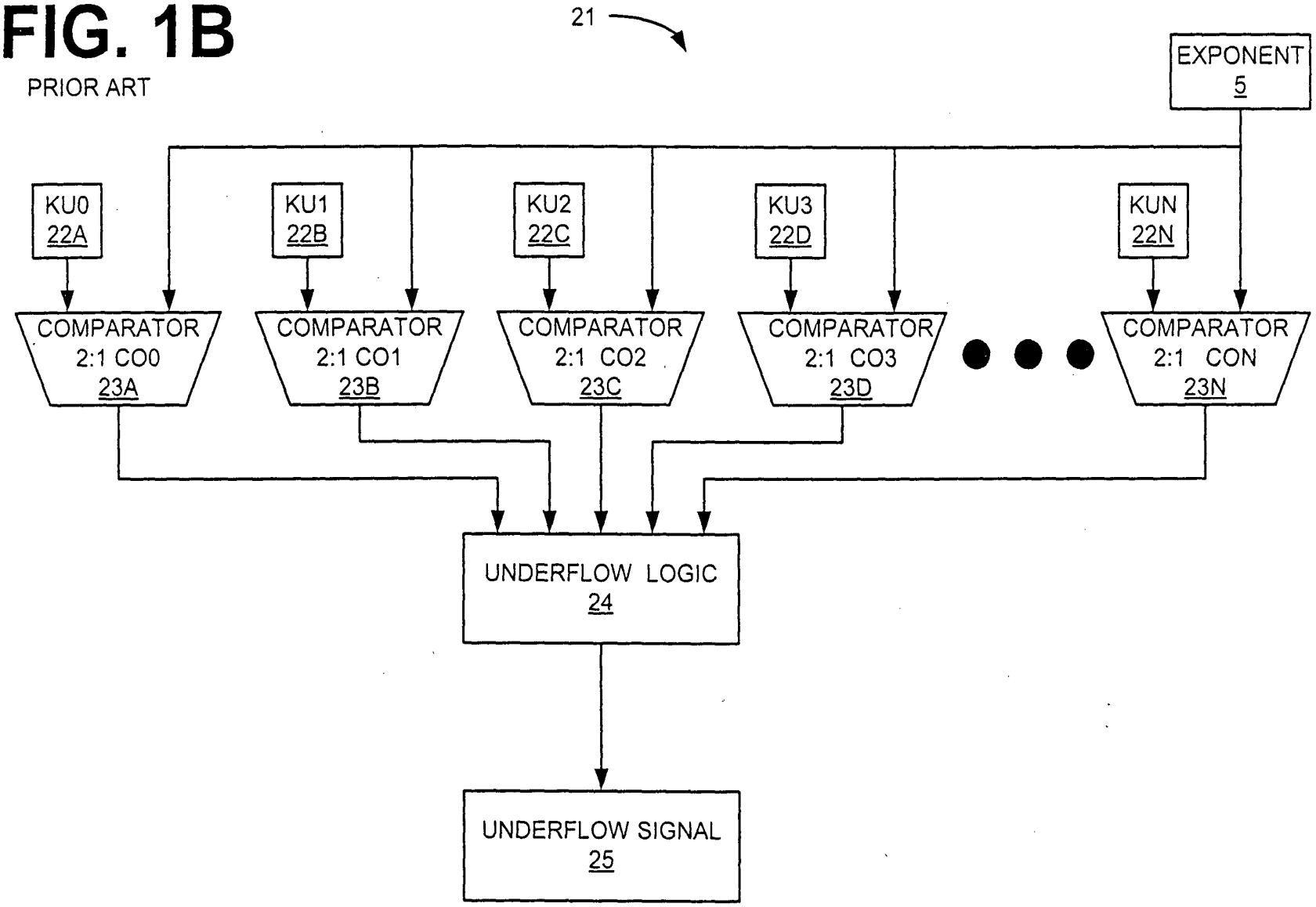


FIG. 2

PRIOR ART

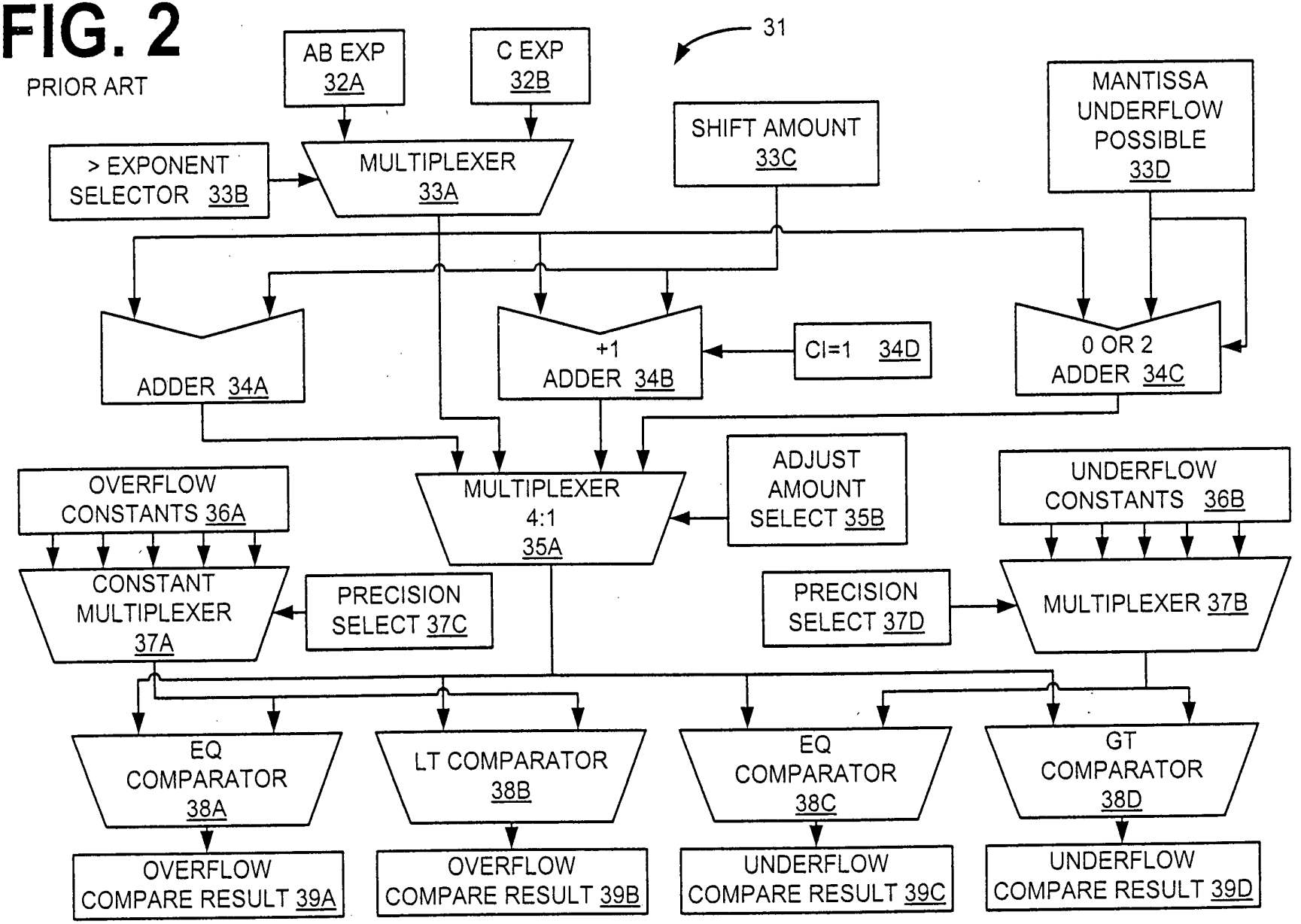


FIG. 3A

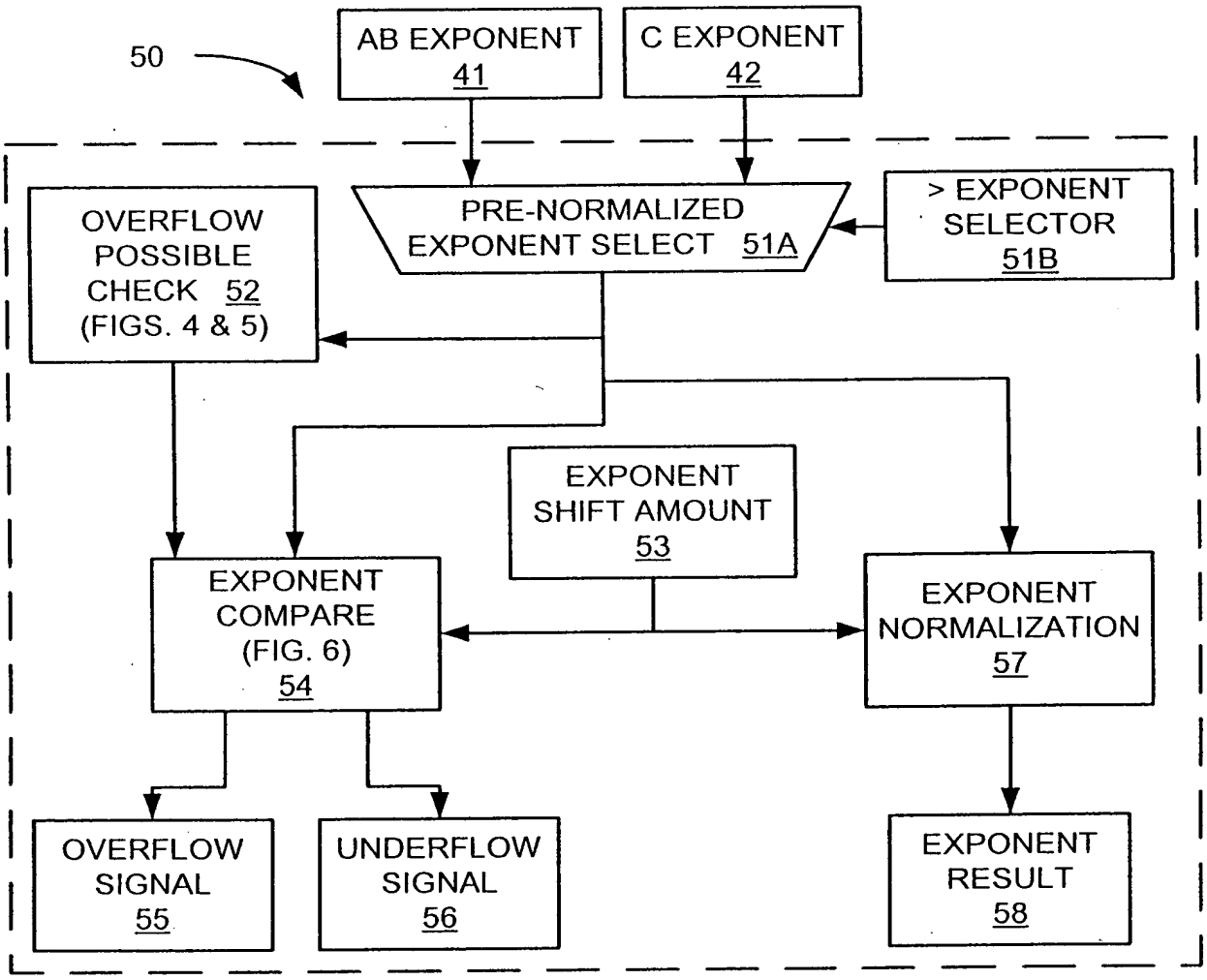

50
AB EXPONENT 41
C EXPONENT 42
OVERFLOW POSSIBLE CHECK 52 (FIGS. 4 & 5)
PRE-NORMALIZED EXPONENT SELECT 51A
> EXPONENT SELECTOR 51B
EXPONENT SHIFT AMOUNT 53
EXPONENT COMPARE (FIG. 6) 54
EXPONENT NORMALIZATION 57
OVERFLOW SIGNAL 55
UNDERFLOW SIGNAL 56
EXPONENT RESULT 58

FIG. 3B

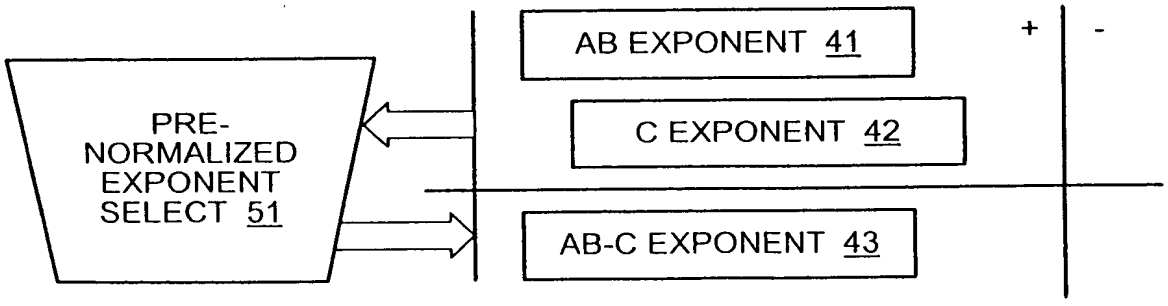

PRE-NORMALIZED EXPONENT SELECT 51
AB EXPONENT 41
C EXPONENT 42
AB-C EXPONENT 43
+
-

FIG. 3C

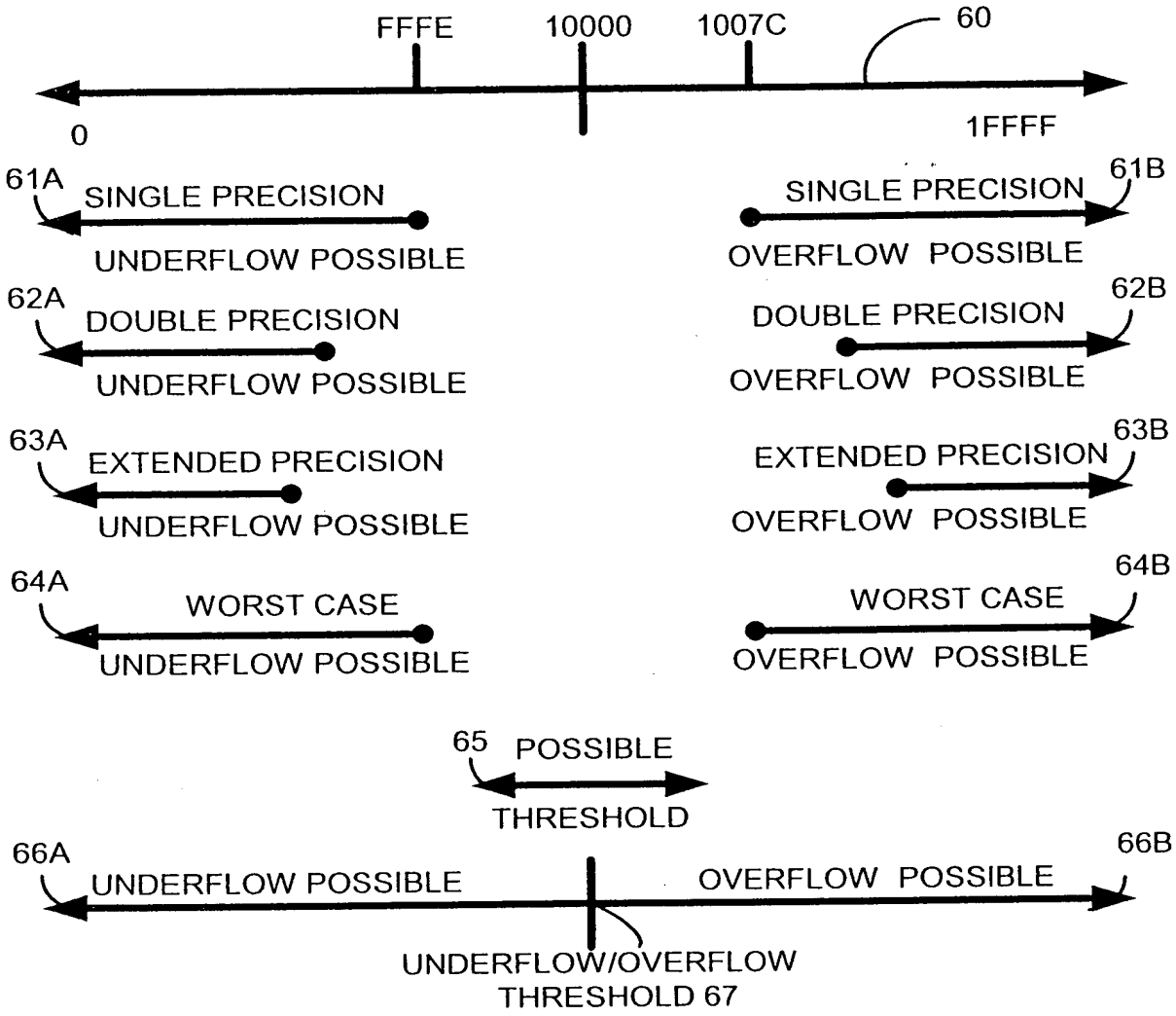


FIG. 3D

68

MSB S 68A	17 68B	16 68C	15 68D	...	LSB 1 0	OVERFLOW POSSIBLE 1=YES
0	0	0	X	...	X X	0
0	0	1	X	...	X X	1
0	1	0	X	...	X X	1
0	1	1	X	...	X X	1
1	0	0	X	...	X X	0
1	0	1	X	...	X X	0
1	1	0	X	...	X X	0
1	1	1	X	...	X X	0

FIG. 4A

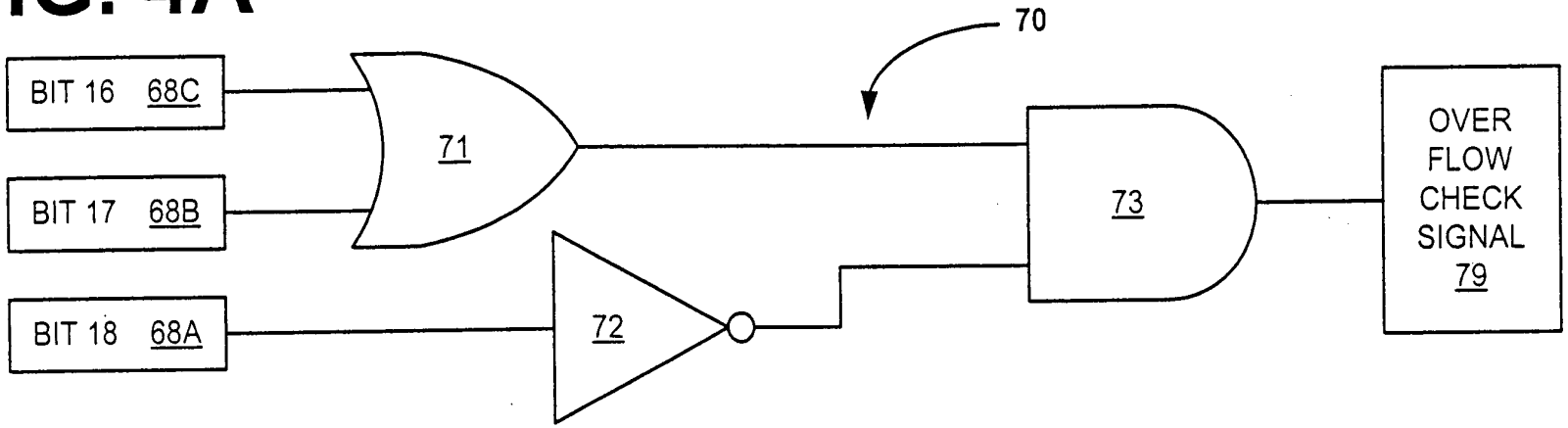

70
BIT 16 68C
BIT 17 68B
BIT 18 68A
71
72
73
OVER FLOW CHECK SIGNAL 79

FIG. 4B

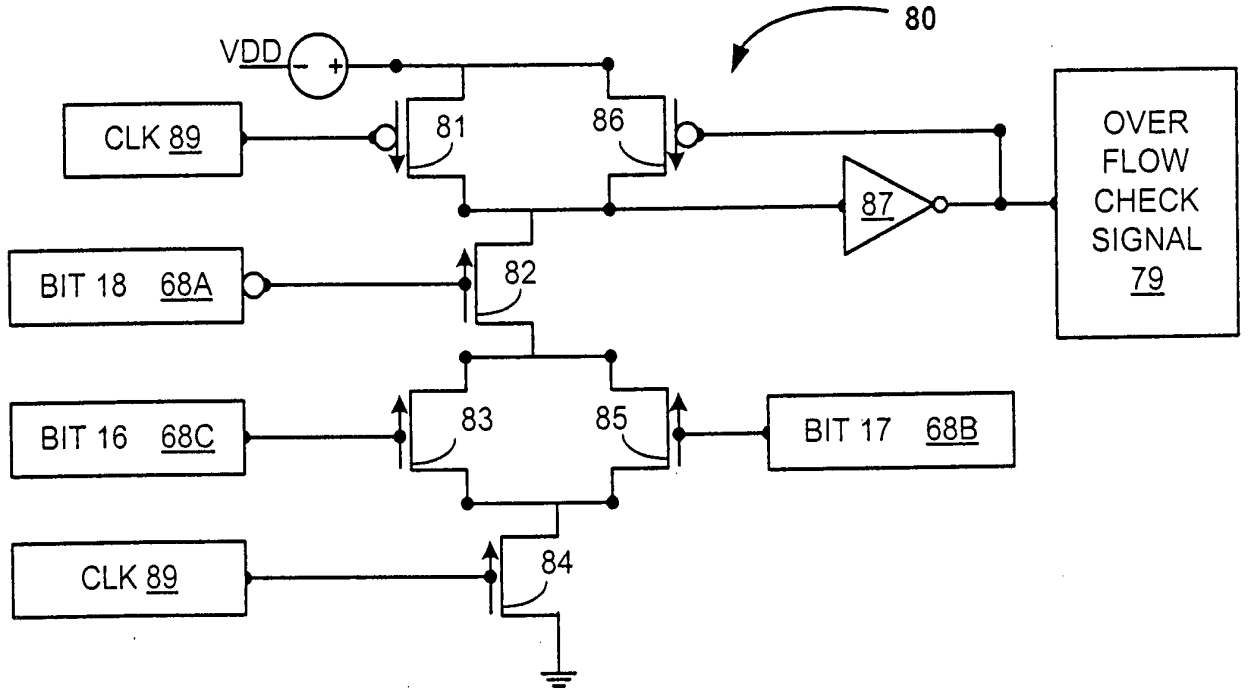

80
VDD
CLK 89
81
86
87
OVER FLOW CHECK SIGNAL 79
BIT 18 68A
82
BIT 16 68C
83
85
BIT 17 68B
CLK 89
84

FIG. 5A

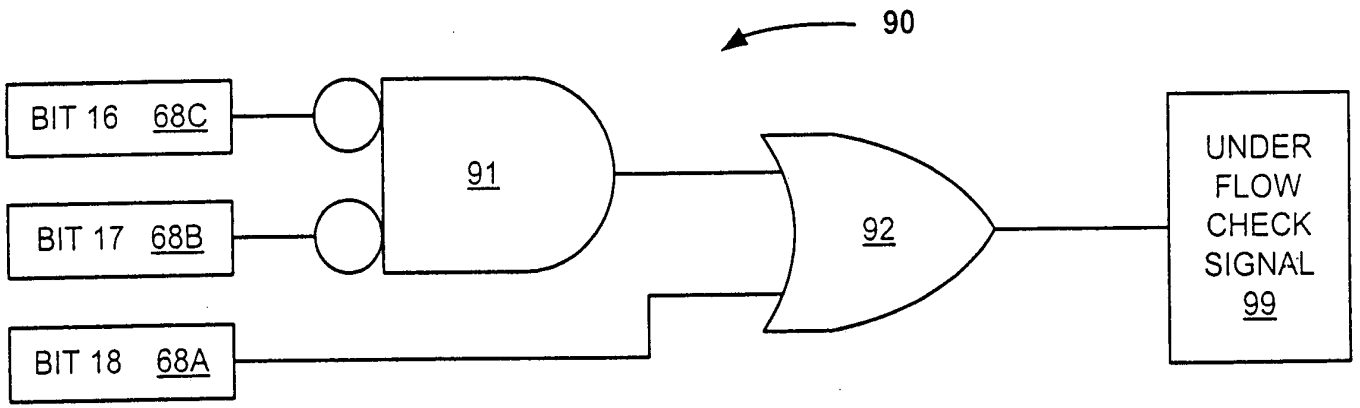

90
BIT 16 68C
BIT 17 68B
BIT 18 68A
91
92
UNDER FLOW CHECK SIGNAL 99

FIG. 5B

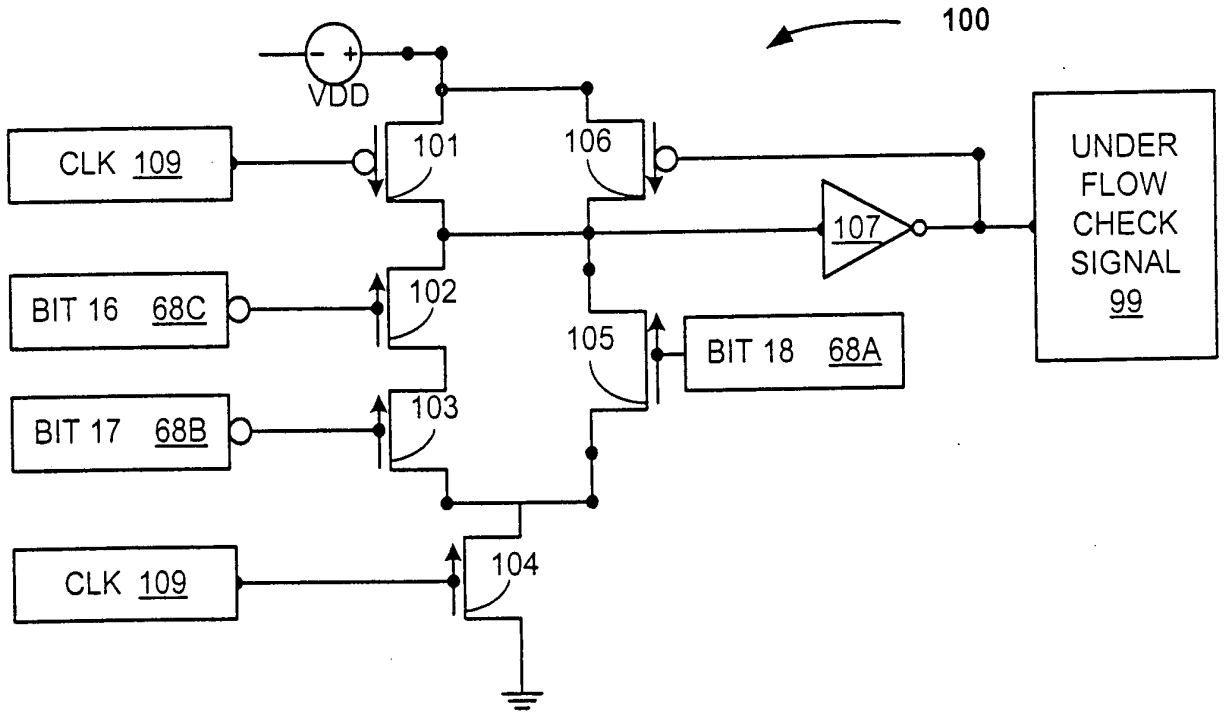

100
VDD
CLK 109
101
106
107
UNDER FLOW CHECK SIGNAL 99
BIT 16 68C
102
105
BIT 18 68A
BIT 17 68B
103
CLK 109
104

FIG. 6

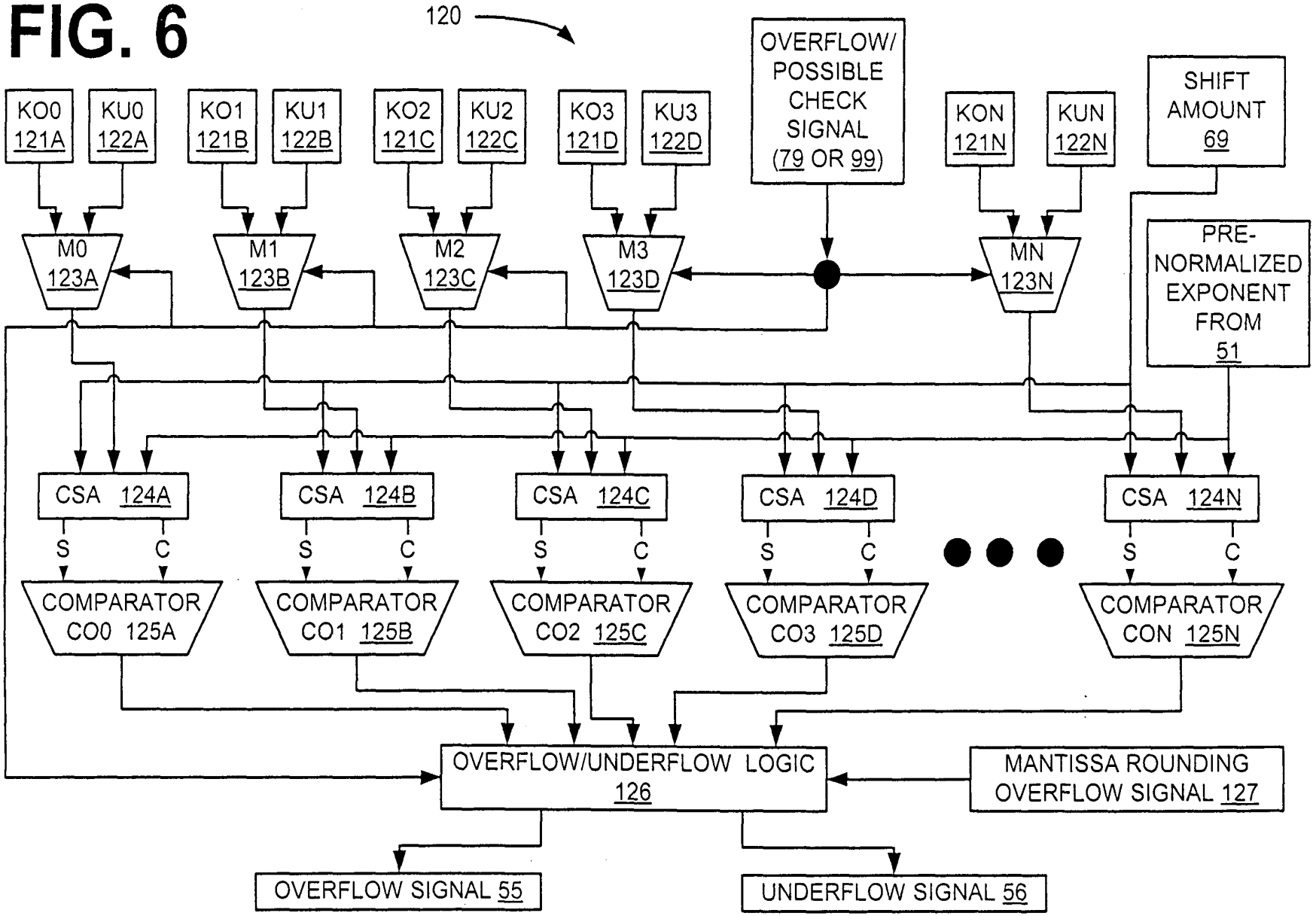

120
KO0 121A
KU0 122A
KO1 121B
KU1 122B
KO2 121C
KU2 122C
KO3 121D
KU3 122D
OVERFLOW/ POSSIBLE CHECK SIGNAL (79 OR 99)
KON 121N
KUN 122N
SHIFT AMOUNT 69
M0 123A
M1 123B
M2 123C
M3 123D
MN 123N
PRE-NORMALIZED EXPONENT FROM 51
CSA 124A
CSA 124B
CSA 124C
CSA 124D
CSA 124N
S
C
COMPARATOR CO0 125A
COMPARATOR CO1 125B
COMPARATOR CO2 125C
COMPARATOR CO3 125D
COMPARATOR CON 125N
OVERFLOW/UNDERFLOW LOGIC 126
MANTISSA ROUNDING OVERFLOW SIGNAL 127
OVERFLOW SIGNAL 55
UNDERFLOW SIGNAL 56

FIG. 7A

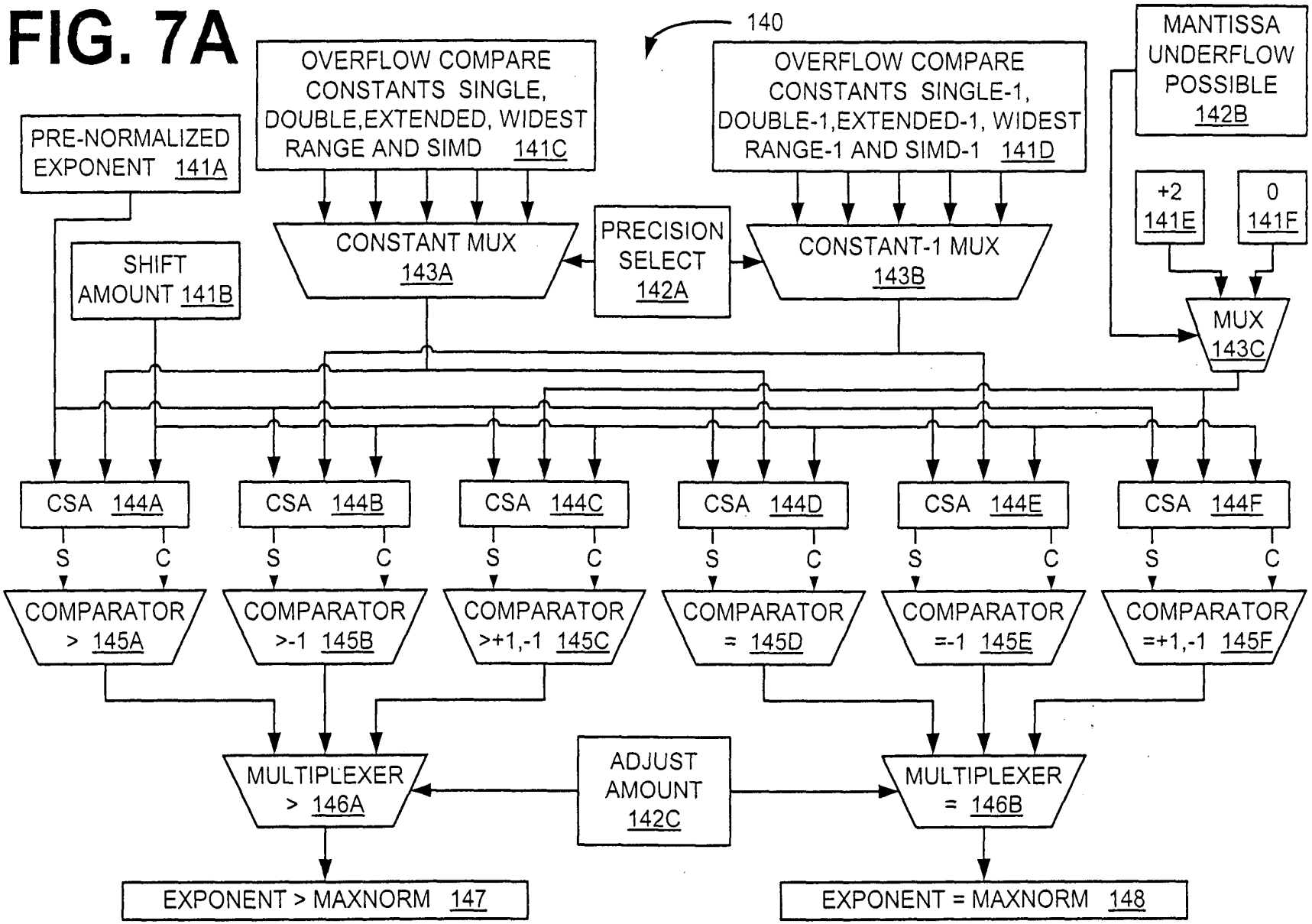

140
OVERFLOW COMPARE CONSTANTS SINGLE, DOUBLE,EXTENDED, WIDEST RANGE AND SIMD 141C
OVERFLOW COMPARE CONSTANTS SINGLE-1, DOUBLE-1,EXTENDED-1, WIDEST RANGE-1 AND SIMD-1 141D
MANTISSA UNDERFLOW POSSIBLE 142B
PRE-NORMALIZED EXPONENT 141A
SHIFT AMOUNT 141B
CONSTANT MUX 143A
PRECISION SELECT 142A
CONSTANT-1 MUX 143B
+2 141E
0 141F
MUX 143C
CSA 144A
CSA 144B
CSA 144C
CSA 144D
CSA 144E
CSA 144F
S
C
COMPARATOR > 145A
COMPARATOR >-1 145B
COMPARATOR >+1,-1 145C
COMPARATOR = 145D
COMPARATOR =-1 145E
COMPARATOR =+1,-1 145F
MULTIPLEXER > 146A
ADJUST AMOUNT 142C
MULTIPLEXER = 146B
EXPONENT > MAXNORM 147
EXPONENT = MAXNORM 148

FIG. 7B

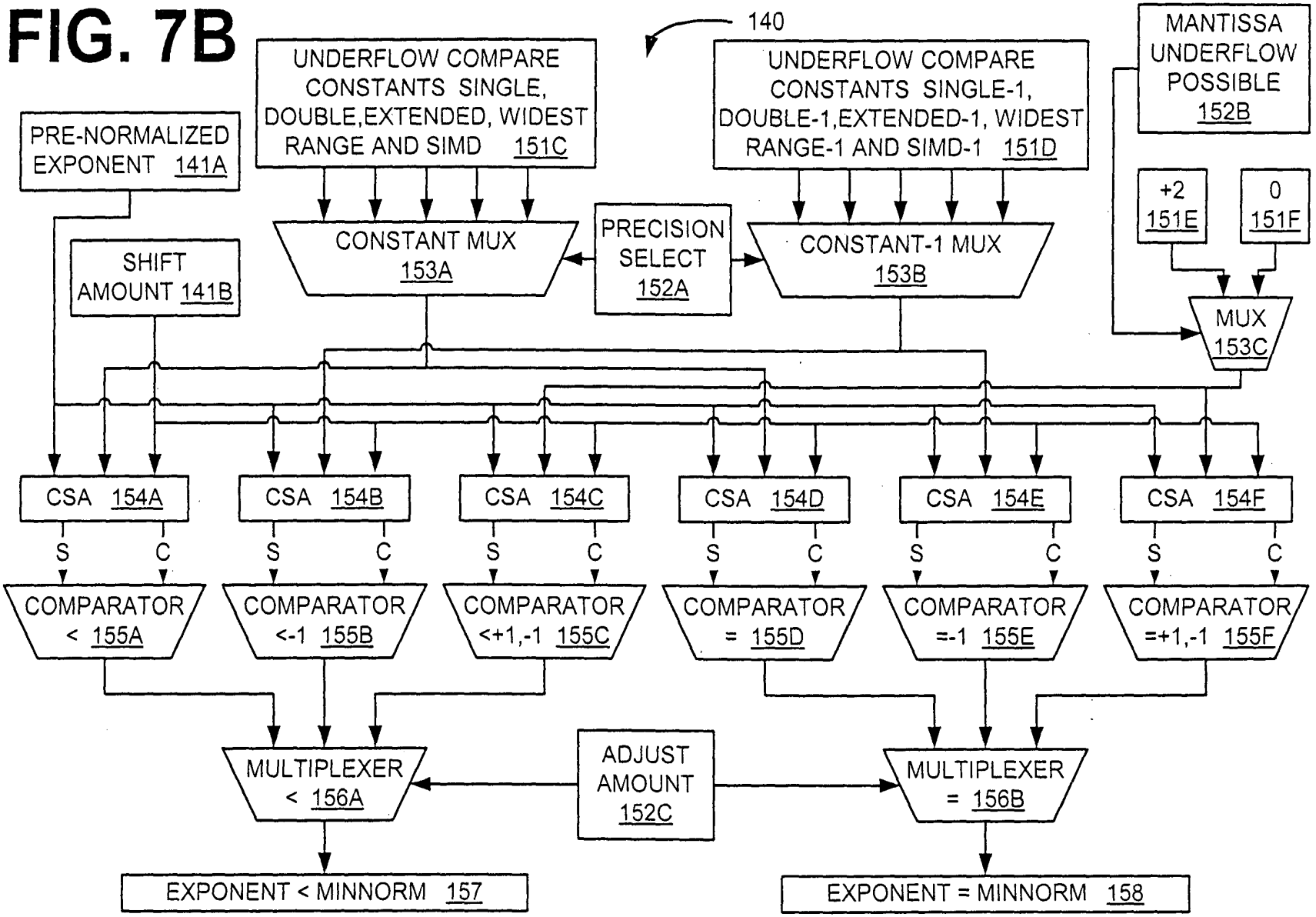

140
UNDERFLOW COMPARE CONSTANTS SINGLE, DOUBLE,EXTENDED, WIDEST RANGE AND SIMD 151C
UNDERFLOW COMPARE CONSTANTS SINGLE-1, DOUBLE-1,EXTENDED-1, WIDEST RANGE-1 AND SIMD-1 151D
MANTISSA UNDERFLOW POSSIBLE 152B
PRE-NORMALIZED EXPONENT 141A
SHIFT AMOUNT 141B
CONSTANT MUX 153A
PRECISION SELECT 152A
CONSTANT-1 MUX 153B
+2 151E
0 151F
MUX 153C
CSA 154A
CSA 154B
CSA 154C
CSA 154D
CSA 154E
CSA 154F
S
C
COMPARATOR < 155A
COMPARATOR <-1 155B
COMPARATOR <+1,-1 155C
COMPARATOR = 155D
COMPARATOR =-1 155E
COMPARATOR =+1,-1 155F
MULTIPLEXER < 156A
ADJUST AMOUNT 152C
MULTIPLEXER = 156B
EXPONENT < MINNORM 157
EXPONENT = MINNORM 158

FIG. 8

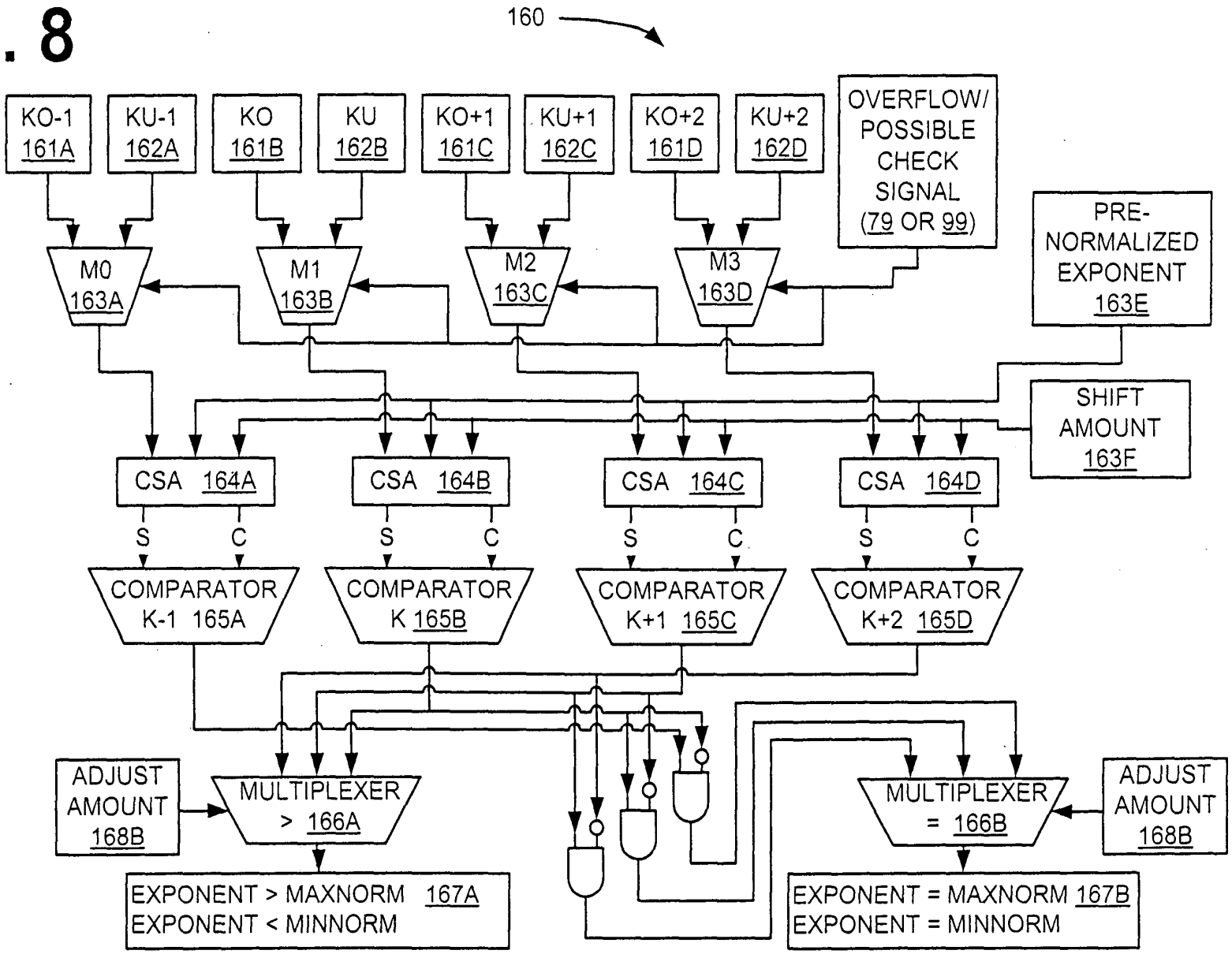

160
KO-1 161A
KU-1 162A
KO 161B
KU 162B
KO+1 161C
KU+1 162C
KO+2 161D
KU+2 162D
OVERFLOW/ POSSIBLE CHECK SIGNAL (79 OR 99)
PRE-NORMALIZED EXPONENT 163E
M0 163A
M1 163B
M2 163C
M3 163D
SHIFT AMOUNT 163F
CSA 164A
CSA 164B
CSA 164C
CSA 164D
S
C
COMPARATOR K-1 165A
COMPARATOR K 165B
COMPARATOR K+1 165C
COMPARATOR K+2 165D
ADJUST AMOUNT 168B
MULTIPLEXER > 166A
MULTIPLEXER = 166B
ADJUST AMOUNT 168B
EXPONENT > MAXNORM 167A
EXPONENT < MINNORM
EXPONENT = MAXNORM 167B
EXPONENT = MINNORM

FIG. 9A

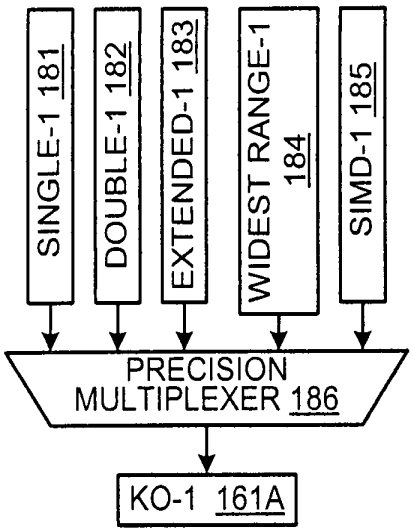


FIG. 9B

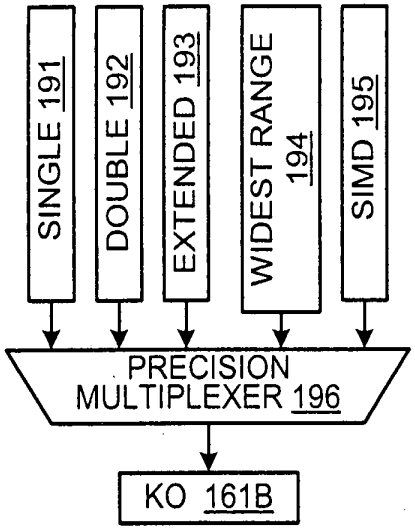


FIG. 9C

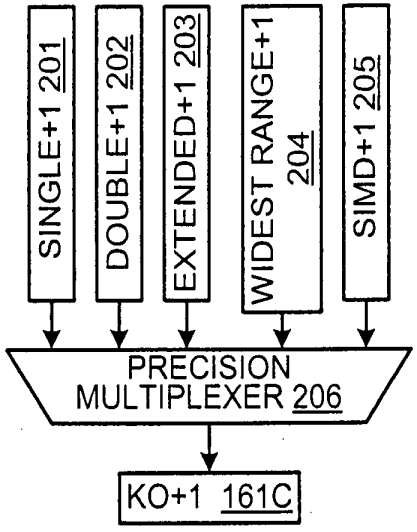


FIG. 9D

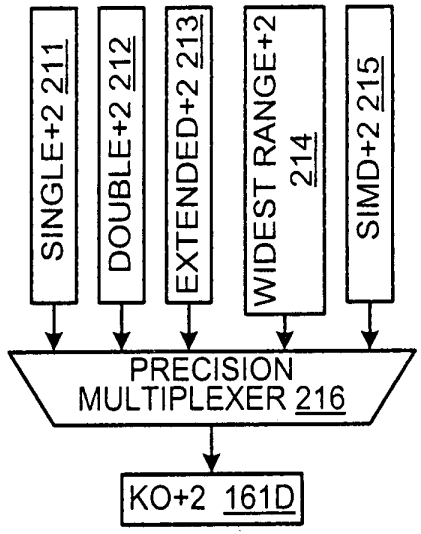


FIG. 10A

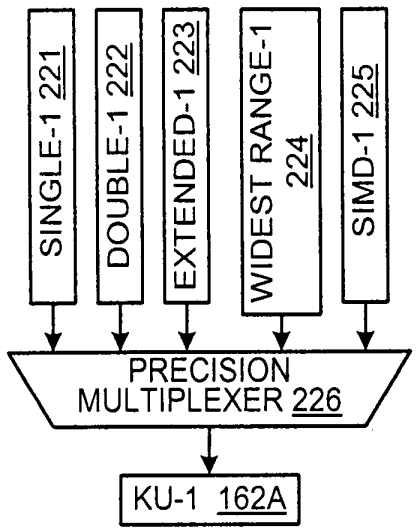


FIG. 10B

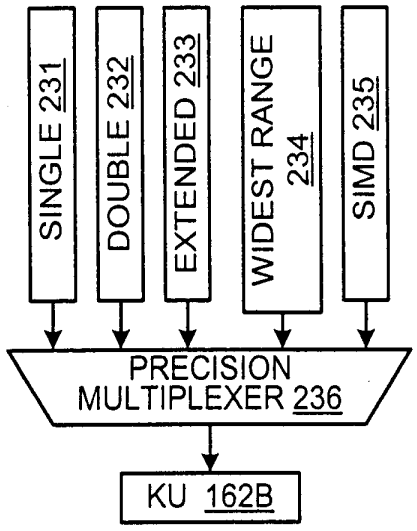


FIG. 10C

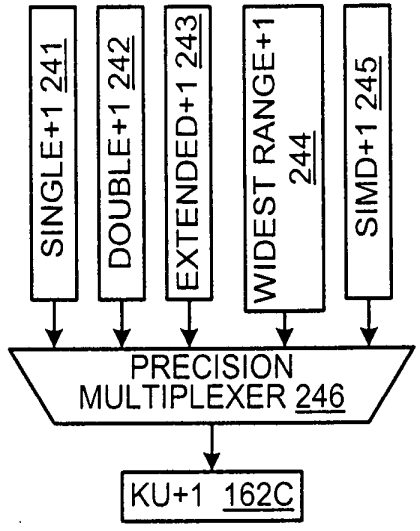


FIG. 10D

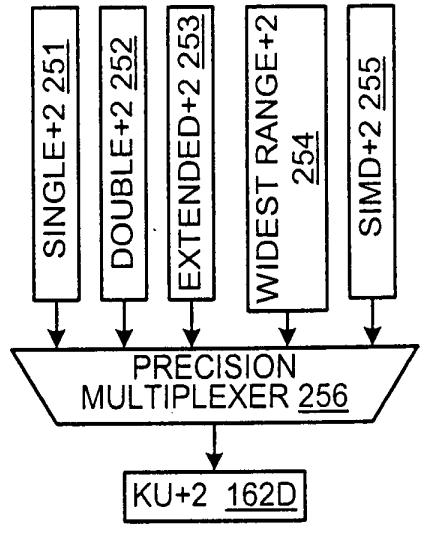
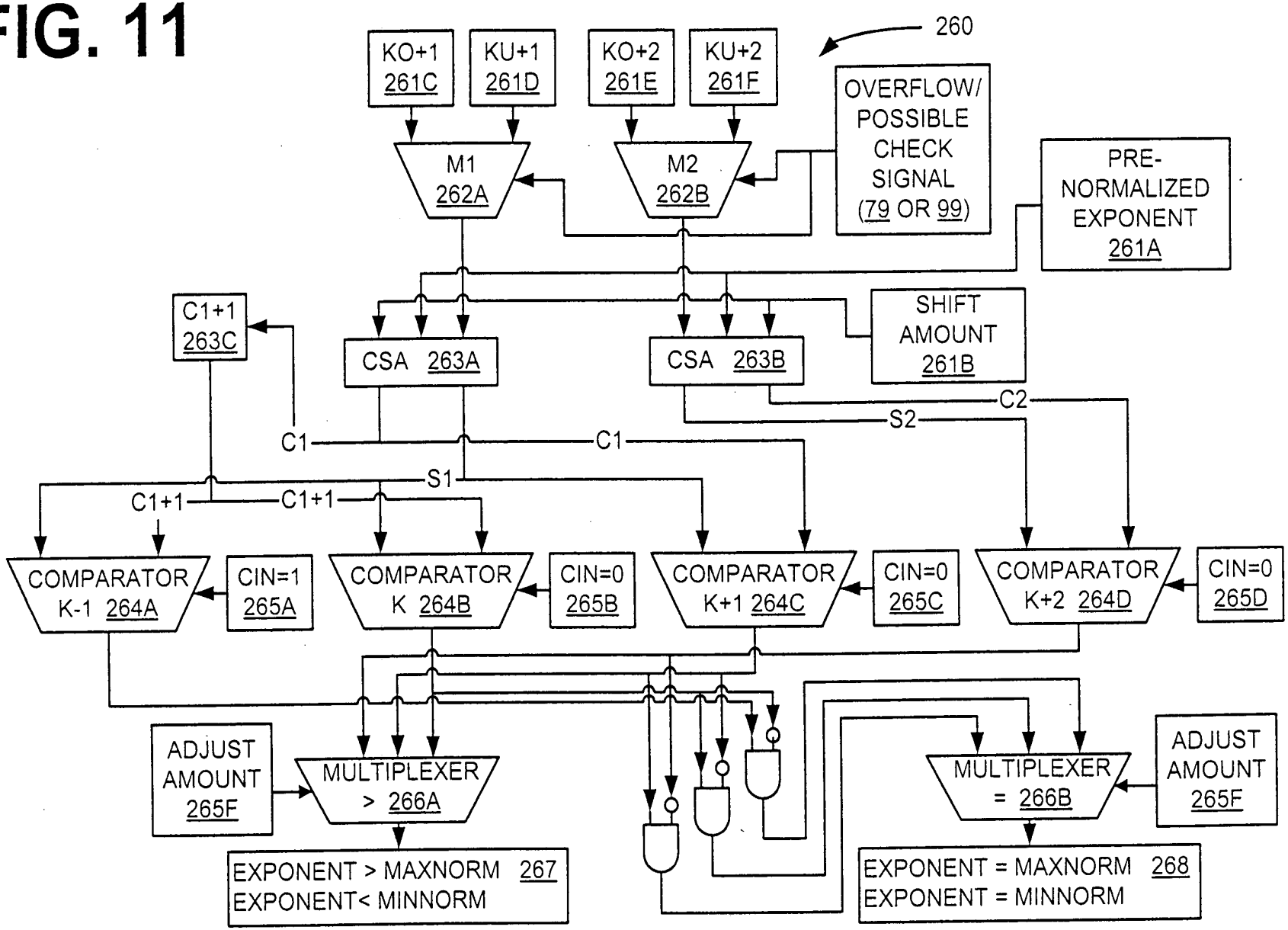


FIG. 11


260
KO+1 261C
KU+1 261D
KO+2 261E
KU+2 261F
OVERFLOW/ POSSIBLE CHECK SIGNAL (79 OR 99)
PRE-NORMALIZED EXPONENT 261A
M1 262A
M2 262B
C1+1 263C
CSA 263A
CSA 263B
SHIFT AMOUNT 261B
C2
S2
C1
C1
S1
C1+1
C1+1
COMPARATOR K-1 264A
CIN=1 265A
COMPARATOR K 264B
CIN=0 265B
COMPARATOR K+1 264C
CIN=0 265C
COMPARATOR K+2 264D
CIN=0 265D
ADJUST AMOUNT 265F
MULTIPLEXER > 266A
MULTIPLEXER = 266B
ADJUST AMOUNT 265F
EXPONENT > MAXNORM 267
EXPONENT< MINNORM
EXPONENT = MAXNORM 268
EXPONENT = MINNORM